NOTES UPON SOME TINEID LARVAE.

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Antispila nyssaefoliella and *A. cornifoliella*.

I have had specimens of the imagos of both of these species in my collections, but not at the same time, and therefore have not been able to compare them. Dr. Clemens notices some minute differences between them, but seems to rely more upon supposed differences in the maculation of the larvae as indicating their specific distinction. But these characters are not altogether reliable; for the number and distinctness of the maculae differ in the same individual at different ages, the number increasing with the age of the larva until it reaches the last larval stage. At least, this is the case with *nyssaefoliella*, of which Dr. Clemens says, "dark atoms along the dorsum; ventral surface with a line of two black spots," though just what "a line of two black spots" may mean, I do not know. In a specimen now before me there are nine blackish spots behind the cervical shield on the dorsal surface, and twelve on the ventral surface. Dr. Clemens further says that "after the last moulting the first segment is black, and the dorsal spots become a black vascular line," which is certainly incorrect; for in its last larval stage, when taken from its cocoon, I have found the larva to be depressed, fat, snowy white with the mouth parts tinged with ferruginous, but the larva otherwise immaculate. It has a single black ocellus about the middle of each side of the head. The larvae of this genus are completely apodal, and in the youngest larvae that I have seen the larval trophi were fully developed; that is, they were equivalent to the second form of trophi of larvae of *Lithocolletis*, *Phyllocnistis*, &c.; and I think the larvae leave the egg in this stage of development, without passing through what I have elsewhere mentioned as the first form of trophi of the genera above named.

I have never found more than two exuviae in an *Antispila* mine, and am not certain as to the number of moults before passing into the pupa state; it is probably not more than two.

The larva of *A. viticordifoliella* in its last stage is, like that of *nyssaefoliella*, immaculate; but it is yellowish white, and not snowy white like the latter. These larvae crawl but little if at all, after cutting out their discs. Indeed, from their structure, locomotion would seem to be impossible, or nearly so.

Aspidisca lucifluella Clem.

I have succeeded in raising this species from the larva, and find, as elsewhere suggested, that the captured specimens described by me as *A. ella* belong to this species.

The larvae of *Aspidisca*, as stated by Dr. Clemens, are apodal, having the thoracic feet represented by sucker-like discs. I have not been able as yet to determine whether these discs really operate as suckers, or whether there is a secretion exuded from them which enables the larvae to adhere to the surface. The anal prolegs are represented by small lobes, each of which has a recurved hook, by means of which the larva anchors itself inside of its case, which, notwithstanding the absence of legs, and depending only on the "suckers," it drags through grass, and over fences, sometimes for more than a hundred metres, before "tying up" for pupation. These anal hooks are much more distinctly developed in *A. splendoriferella* and *A. lucifluella*, than in *A. saliciella*.

I have never been able to detect any trace of the exuviae in the mines of any of the species, and am induced to believe that the larva moults only once — that is, when it passes into the pupa state. In the youngest larvae that I have seen, the trophi are of the character above referred to under *Antispila* as the second or perfect form.

I have elsewhere followed a suggestion of Mr. Stainton in referring both *Antispila* and *Aspidisca* to the *Glyphipterygides*, but the larvae differ very decidedly from those of *Glyphipteryx*, and those of *Aspidisca* are very different in form and structure from those of *Antispila*. Dr. Clemens' statement that the mature larvae of *Aspidisca* are flattened, is too strong; at most they can only be said to be a little depressed, and are much less so than are the larvae of *Antispila*. His statement, "these are not supplied with hooks," is rather indefinite, but if intended to apply to the anal prolegs of mature larvae is certainly incorrect, though entirely correct when applied to the ventral prolegs, or rather to their sucker-like substitutes.

Aeaea (*Chrysopeleia*) *purpuriella*.

Among leaves of the black locust (*Robinia pseudacacia*), gathered because they contained mines of *Lithocolletis robiniella*, in July, several were observed in which there appeared to be either small white mines, or thin white silken webs at the junction of some of the veins with the midrib, each of which contained a small larva. But neither the mines nor larvae received anything more than a passing notice, as my attention was directed to watching the development of the larva of *L. robiniella*. But from the collection I bred a specimen of *A. purpuriella*, the larva of which has been heretofore unknown. I can scarcely doubt that it came from one of the larvae in the small mines, as I got nothing else from those leaves but *A. purpuriella* and *L. robiniella;* and the position of the mine (or web?) is exactly that of the mine of *Aeaea ostryaeella* in *Ostrya* leaves (see frontispiece to "Tineina of North America"), though it is much smaller than the latter. At the same time, it should be stated, the web of the very young larva of *Gelechia pseudacaciella* is only distinguishable, on a hasty glance, from the supposed mines of *Aeaea purpuriella*, by the fact that a very slender branch extends from the main web for some dis-

tance along the midrib, in the case of *G. pseudacaciella*, which also feeds on locust leaves. At any rate, the specimen of *A. purpuriella* was certainly bred from locust leaves, whatever be its mode of feeding thereon.

Coleophora.

A species of this genus which I have not succeeded in rearing, mines the leaves of elm (*Ulmus americana*), sometimes in large numbers. All of the larval cases that I observed had been cut out from the edge of the leaf, showing the serrations along the dorsal surface of the case; yet it was frequently found in these cases feeding generally over the under surface of the leaves. It must therefore retire to the edge of the leaf to feed shortly before changing its case.

Gelechia pseudacaciella.

In the note on *Aeaea purpuriella* above, I have referred to the web of the very young larva of this species as being very similar to the web (or mine?) of *A. purpuriella;* being placed like it at the junction of a vein with the midrib, but differing from it by having a narrow strip of web extending along the midrib. But *G. pseudacaciella* does not continue long to feed in this way. It may afterwards be found — sometimes when nearly grown — feeding between two of the leaflets sewed together; but much more frequently it may be found in the mines of *Lithocolletis robiniella*, and more rarely in those of *Lithocolletis ornatella*. I have sometimes seen it deliberately cut its way into the mines of *L. robiniella;* and when there it does not confine itself to a vegetable diet, for I have opened the mines and *found the larva in the act of eating the pupa of its host*. I do not know that it eats the larva of *L. robiniella*, though from the frequency of the occurrence of *G. pseudacaciella* in mines of *L. robiniella* from which the latter larva was absent, I suspect that it does. Possibly the struggles of the *L. robiniella* larva might drive that of *G. pseudacaciella* away; but I know that the pupa is eaten, having seen it.

I have never found the larva of *G. pseudacaciella* except on locust trees; but Prof. Riley once showed me two specimens of a *Gelechia* moth which I was unable to distinguish from *G. pseudacaciella*, and which Mr. Riley said he had bred from larvae found on wild cherry (*Prunus serotina*). It is not likely that the larva feeds on two plants so remote from each other as locust and wild cherry; but a larva which varies its diet of locust leaves by an occasional repast on the living pupa of a *Lithocolletis*, need not be supposed to be excessively fastidious.

The only difference that I have observed between the very young and the mature larvae of *G. pseudacaciella* is that the markings are more prominent in the latter.

There is a larva of an unknown species and genus which burrows in June and July in the pith of the preceding year's shoots of *Robinia pseudacacia*. The markings and form of the ventral segments are not very different from those of *G. pseudacaciella* but the head and thoracic segments are enlarged and are of a black or piceous hue, and the mouth parts are large and strong, as becomes a burrowing larva. It has sixteen well developed legs and prolegs. It probably will form the type of a new genus. It can hardly be the unknown larva of *Xylesthia clemensella*, for that larva feeds in the solid wood of locust

posts and trees, and therefore probably does not feed on the pith of living branches.

Gracilaria negundella.

This species has heretofore been recorded only from Denver, Colorado; but I have also found the leaves of the box alder its food plant, in Kentucky, rolled into cases precisely similar to those made by this species in Colorado, and containing a *Gracilaria* larva, of which, however, I did not succeed in rearing the imago. I have, however, no doubt that it is the same species.

Laverna gleditschiaeella.

The egg of this species (which I have found only by dissection of the female) is a very pretty microscopic object. It is opaque; the centre of the larger end projects a short distauce, and ridges extend on every side from the projection to the margin, with concave valleys between them, and these ridges and valleys are continued along the surface towards the smaller end of the egg, but grow gradually more indistinct; they are not straight, but have a wavy outline. The egg is depressed and narrows gradually towards the smaller end, which is somewhat sharply and suddenly rounded: color, white.

The eggs of *Argyresthia undulatella* Cham., which I have obtained in the same way, resemble microscopic hen's-eggs, except that they are a little more globular.

Nepticula nyssaefoliella n. sp.

Only the larva is known, as I have not yet succeeded in getting the imago. The larva is greenish white with deep green contents; head pale ferruginous with the mouth-parts of a deeper green; the mine is linear, ending in a brownish yellow blotch, and the frass is attached to the loosened upper cuticle. No exuviae were found in the mine, and this larva, like most larvae of this genus, undergoes no moult until pupation. I believe, however, one or two instances have been recorded of moults of larvae of this genus in Europe. But usually the entire larval life does not exceed thirty-six hours.

There is a larva of this genus which is not uncommon in hickory leaves (*Carya alba*), in which it makes a large blotch mine. The larva itself is rather large for the genus, but I have not succeeded in rearing the imago. Another hickory *Nepticula* which I have not succeeded in rearing, makes a linear mine about 2.5 cm. long, in the first and last fourths of which the frass is deposited in a central line, while in the middle portion it is deposited in transverse rows of small specks, somewhat as in the mine of the European *N. viscerella*.

Nepticula quercicastanella Cham., heretofore bred from leaves of the chestnut oak (*Quercus castanea*), I have also bred from leaves of the white oak (*Q. alba*).

N. castaneaefoliella Cham., heretofore bred from chestnut leaves (*Castanea*), I have also bred from the leaves of white oak.

Dr. Clemens (*Tin. N. Amer.*, p. 172–), mentions several other *Nepticula* larvae which have not as yet been bred, and besides these there is a species which makes a long crooked linear mine in leaves of the sugar maple (*Acer saccharinum*); another in leaves of sumac (*Rhus*); another in elm leaves (*Ulmus*), and many others; in fact we know comparatively little yet of the *Nepticula* of this country. There is also a species mining leaves of hackberry (*Celtis*).

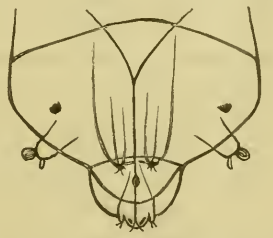
Ornix prunivorella Cham.

This species, and probably most or all other species of the genus, like those of *Gracilaria*, to which it is so closely allied, assume what I have called the second form of larval trophi at the second moult.

Phyllocnistis.

In a paper in PSYCHE on *Lithocolletis*, I incidentally mentioned the presence in *Phyllocnistis* of certain projections from the sides of certain segments of the larva, which, though not occupying the places usually occupied by legs, and perhaps not homologous therewith, yet served, to some extent at least, the same purpose, and so I questioned the propriety of describing *Phyllocnistis* larvae as apodal. I was therefore greatly surprised, on the next occasion when I observed larvae of this genus, that I could find no trace whatever of these pseudopodia; then again in others I would find them — sometimes the full complement, at others only a part, and sometimes in the same specimen I would find them and then fail again. The fact is that they are retractile.

I formerly thought (PSYCHE, *loc. cit.*), from analogy with *Lithocolletis* larvae that there were seven stages of larval life in *Phyllocnistis*, but I have not been able to verify this belief. On the contrary, I find only two stages. The mines are long winding linear tracts, ending in a *small* blotch, which, however, remains a blotch only a very short time; only, indeed, while the larva is spinning its cocoon, which draws the blotch into a small knot, or pucker. The linear part of the mine is occupied by the larva in its first stage; at least I have not been able to find any evidence of a moult while the mine remains linear. The form of the trophi is then very similar to that of the earlier stages of *Lithocolletis* larvae (see PSYCHE, v. 2, p. 83, fig. 2). Having nearly finished feeding, the larva eats out the parenchyma next to the upper cuticle, making a small blotch. Although the rudimentary spinneret is visible, the silk is not yet secreted, and the larva cannot spin; but resting quietly in the little blotch for a few hours, it then casts off the old skin and appears no longer a flattened larva with the first form of trophi, but is simply depressed, nearly cylindrical, and with the trophi as in the accompanying figure.



These trophi are evidently not intended for use in eating, and in fact the larva does not eat any more; it becomes rapidly cylindrical (or rather oblong conic, for it tapers rapidly posteriorly). The pseudopodia are still visible, and the larva when removed from its cocoon "bumps around" on these stubs of legs, in a rather ridiculous manner. The spinneret and silk glands are now fully developed; the larva quickly spins its cocoon, and in little more than a day after this moult it passes its second moult, and becomes a pupa.

I find no material difference in the course of development in any of the species *ampelopsiella*, *vitigenella*, *vitifoliella* and *magnoliaeella*. The latter species is known only in the larval and pupal states,

and is probably identical with *liriodendronella*.

Tischeria.

In all of the species of this genus of which I have traced the life history (*T. malifoliella*, *T. quercivorella* and *T. quercitella*), there are the same number of moults as in the greater number of lepidoptera, viz., four (or five, if we include the moult into the pupal state); and there are no marked differences, either in color or structure, between the same larvae at different stages of growth. The oak-feeding species are more readily distinguished from each other by the character of the mines, than by the appearance of either the larva or imago. Mr. Stainton's figure of *T. marginea* (*Nat. Hist. Tin.*, v. 3, plate), is very much like the larva of our *T. malifoliella*, but the head of *marginea*, as figured, is darker than that of *malifoliella*, and the last three segments, especially the last one, in the figure, are too short and narrow. The wings of the imago of *marginea*, as figured, are paler than those of *malifoliella*. The larva of *malifoliella* is also slenderer than that of *marginea*, and more moniliform, while each segment has on each side three hairs, which are not represented in the figure of *marginea*. *Marginea* is *perhaps* nearer — or as near — our *T. aenia* F. & B., which, like *marginea*, mines bramble leaves. The mine of *marginea* is, however, wider and more irregular than that of *aenia*.

TRANSFORMATIONS OF *NACERDES MELANURA*.

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As far as I am aware, nothing is yet known of the transformations of this very common beetle. At various times I have hunted assiduously for the larva, but without success. Thinking better luck might follow from trying to obtain larvae in another way, I captured a lot of the beetles with the purpose of getting the eggs. From the fact that the beetles are abundant about buildings with open rafters, I concluded that dry pine wood was the food of the larva, and confined the females in a vessel with a quantity of dry "punky" pine. They laid their eggs freely, and in eight days the young appeared; when first hatched they measured a fraction over one mm. long. At intervals of one or two weeks I measured specimens, and, singularly enough, though apparently in good health, their growth after the first few days was hardly perceptible. At the end of seven months the largest specimens measured barely more than two mm. long; in eleven months four mm., and at the beginning of the fifteenth month all were dead. It would be somewhat remarkable for any larva to sustain life so long under conditions altogether unfavorable. I am confirmed therefore in thinking that pine, or some one of the coniferous woods, in a dry state, is the food of this larva, but think I made a mistake in keeping the vessel so tightly closed as to exclude the air.

The eggs of *Nacerdes* are cylindrical, a fraction over 1 mm. long, a little more than three times as long as their greatest breadth, tapering somewhat toward each end, sometimes slightly curved, rounded at the ends. Color white, somewhat translucent, with a portion at each end semi-transparent.